

CLAIMS

1. A method of filling with powder a container having an open end, the method including:
 - 5 positioning an outlet of a hopper containing powder above the open end of the container;
 - mechanically agitating the hopper so as to cause powder to be transferred from the hopper to the container; and
 - mechanically agitating the container; wherein
 - 10 the steps of mechanically agitating are conducted by at least a predetermined amount sufficient to ensure that the container is filled with powder at a predetermined density.
2. A method according to claim 1 further including:
 - 15 using the volume of the container to define a predetermined volume for the powder.
3. A method according to claim 2 further including:
 - filling the entire volume of the container with powder, the volume of the
 - 20 container equalling the predetermined volume.
4. A method according to claim 3 further including:
 - for at least some of the step of mechanically agitating the hopper, spacing the outlet of the hopper away from the open end of the container so as to overfill the
 - 25 container; and
 - after the steps of mechanically agitating, removing excess powder from the open end of the container.
5. A method according to claim 3 further including;

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positioning the outlet of the hopper across the open end of the container such that the container is filled level with the open end.

6. A method according to claim 2 further including:

5 positioning the outlet of the hopper at a predetermined level within the container so as to define, with the container, the predetermined volume, the predetermined volume being smaller than the volume of the container.

7. A method according to any preceding claim further including:

10 providing the outlet of the hopper with one of an orifice, mesh, screen and grid to separate the powder in the hopper from the container.

8. A method according to claim 7 further including:

15 providing the orifice, mesh, screen or grid with a hole-size small enough that bulk density powder will not flow through under gravity, but large enough to allow powder to fall through during the step of mechanically agitating.

9. A method according to claim 7 or 8 further including:

20 providing the orifice, mesh, screen or grid with a hole-size of approximately 0.5 mm.

10. A method according to any preceding claim wherein one or both of the steps of mechanically agitating includes tapping the hopper and/or container.

25 11. A method according to claim 10 wherein the steps of mechanically agitating include lifting the hopper and container by 1 to 10 mm, then letting the hopper and container fall under gravity to a substantially fixed position.

12. A method according to claim 10 or 11 wherein the step of mechanically

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agitating provides an acceleration of approximately 1000 G to powder in the hopper and container.

13. A method according to claim 10, 11 or 12 wherein the steps of mechanically
5 agitating include tapping the hopper and/or the container between 50 and 500 times.

14. A method according to any preceding claim wherein the steps of
mechanically agitating include vibrating the hopper and/or container.

10 15. A method according to claim 14 further including:
vibrating the hopper and/or container at a frequency between 100 Hz and 1 kHz.

16. A method according to any preceding claim further including:
providing a powder-tight seal between the hopper and container during at least
15 part of the step of mechanically agitating the hopper.

17. A method according to any preceding claim further including:
mechanically connecting the hopper to the container such that mechanical
agitation of one of the hopper and the container causes mechanical agitation of the other
20 of the hopper and the container such that the steps of mechanically agitating the hopper
and container are conducted simultaneously by mechanically agitating the hopper and
container together.

18. A method according to any preceding claim including:
25 adjusting the amount of mechanical agitation of the container so as to vary the
density of the powder in the container, thereby compensating for batch-to-batch
variations in the powder.

19. A method according to any preceding claim wherein at least the step of

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mechanically agitating the container provides impulses to the powder in a direction from the open end of the container into the container.

20. A method of simultaneously filling with powder a plurality of containers
5 having respective open ends, the method including:
providing a hopper having a plurality of outlets
positioning the plurality of outlets above corresponding open ends of the
containers; and
simultaneously conducting the method of any preceding claim for each container.

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21. An apparatus for filling with powder a container having an open end, the
apparatus including:
a support for the container;
a hopper having an outlet and being selectively moveable relative to the support
15 to position the outlet above the open end of a supported container;
a dispenser for mechanically agitating the hopper and container so as to cause
powder to be transferred from the hopper to the container; and
a controller for operating the dispenser by at least a predetermined amount
sufficient to ensure that powder in the container reaches a predetermined density.

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